The properties of \( \| \mathbf{v} \| \):

- \( \| \mathbf{v} \| > 0 \)
- \( \| \mathbf{v} \| = 0 \iff \mathbf{v} = \mathbf{0} \)
- \( \| \mathbf{v} \| = \| -\mathbf{v} \| \)
- \( \| a \mathbf{v} \| = |a| \| \mathbf{v} \| \)

Note: a vector \( \mathbf{v} \) for which \( \| \mathbf{v} \| = 1 \) is called a unit vector.

Representing vectors in the plane:

Two unit vectors:
- One \( \| \) to the x-axis, \( \mathbf{i} \)
- One \( \| \) to the y-axis, \( \mathbf{j} \)

\[ \mathbf{v} = a \mathbf{i} + b \mathbf{j} \]

\( a \) and \( b \) called components of the vector \( \mathbf{v} \).

\( a \) is in the direction \( \mathbf{i} \)

\( b \) is in the direction \( \mathbf{j} \).